

That which is claimed is:

1. A method for direct material deposition on a substrate, said method comprising:
 - (a) passing one or more feedstocks through a laser beam under conditions sufficient to convert substantially all of said feedstock(s) into a depositable form, and
 - (b) depositing said depositable feedstock(s) on said substrate,

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wherein said laser beam is generated by at least one laser, each operating at a power of up to about 1 kW.

2. A method according to claim 1, wherein said depositing is carried out under conditions such that substantially no interfacial damage occurs to either said substrate or said deposited feedstock.

3. A method according to claim 1, wherein said feedstock is in finely divided particulate form upon entering said laser beam.

4. A method according to claim 3, wherein energy imparted to said finely divided particulate feedstock material by said laser beam is controlled by varying at least one of the time of flight of said finely divided particulate feedstock material through said laser beam, the particle size of said finely divided particulate feedstock material, the angle of trajectory of said finely divided particulate feedstock material, the wavelength of said laser beam, or the energy of said laser beam.

5. A method according to claim 3, wherein a trajectory path of said finely divided particulate feedstock material is selected so that laser energy reflected by some of the particles of the feedstock material is incident onto other particles of the feedstock material within said path.

6. A method according to claim 3, wherein said particles are less than about 40 μm .

7. A method according to claim 3, wherein said finely divided feedstock is comprised of charged particles.

8. A method according to claim 7, wherein said feedstock deposition is controllably aimed by passing said charged powder feedstock material through one or more electrostatic fields and/or magnetic fields.

9. A method according to claim 1, wherein said feedstock is comprised of a dielectric material.

10. A method according to claim 1, wherein said feedstock is a resistive material, a conductive material, a semi-conductive material, or a magnetic material.

11. A method according to claim 1, wherein said depositable feedstock material is substantially in the liquid phase upon impact with said substrate.

12. A method according to claim 1, wherein said feedstock comprises a combination of two or more different materials.

13. A method according to claim 1, wherein said feedstock, upon impact with said deposition substrate, has both liquid and non-liquid phases.

14. A method according to claim 13, wherein the liquid feedstock interacts with non-liquid feedstock, facilitating aggregation of non-liquid feedstock.

15. A method according to claim 1, wherein said feedstock is in a substantially liquid form upon entering said laser beam.

16. A method according to claim 15, wherein said liquid feedstock comprises solid particles mixed with a liquid carrier; wherein said liquid carrier is vaporized upon passing of said feedstock through said laser.

17. A method according to claim 15, wherein said liquid feedstock comprises a feedstock material and a decomposable solvent; wherein said solvent decomposes prior to deposition of said feedstock material, resulting in deposition of substantially pure feedstock.

18. A method according to claim 1, wherein said feedstock is deposited in a predetermined pattern.

19. A method according to claim 18, wherein said predetermined pattern comprises an interconnected circuit pattern, including individual electrical components, provided in an electronic format.

20. A method according to claim 19, wherein said electronic format comprises a computer-aided design (CAD) file.

21. A method according to claim 18, wherein deposition of said feedstock in a predetermined pattern is accomplished by controllably aiming said feedstock at said substrate.

22. A method according to claim 21, wherein said controllable aiming is directed by information provided in an electronic format.

23. A method according to claim 21, wherein said aiming of said feedstock material is manually controlled.

24. A method according to claim 21, wherein said controllable aiming directs deposition of said feedstock in a layer-wise manner, whereby multi-layer components can be formed.

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